2-2013

ISTS, February 2013

Iowa Academy of Science

ISTS

The Iowa Science Teachers' Section of the Iowa Academy of Science advocates for excellence in science education by promoting professionalism, influencing policy, and enhancing learning.

Nadine Weirather, editor — February, 2013

Iowa Academy of Science Mission
* *Promote scientific research and dissemination*
* *Improve instruction in the sciences*
* *Promote public understanding of science*
* *Recognize excellence in science and science teaching*

ISTS Leadership

Your Leadership team can be found at http://ists.pls.uni.edu/officers.html

From Our Fall Conference Chair...

ICTM & IAS-ISTS Math Science Fall Conference 2013

We have very exciting news for you! The 2013 Fall Conference will be jointly hosted by ISTS and ICTM!!! What does that mean for you? You'll have opportunities not only in science education, but also mathematics education!

There will be an increase in the number of exhibitors, of the variety of sessions, of hands-on experiences, and in the use of technology.

New for 2013 the Conference will be documented through live tweets on twitter! Watch for opportunities to send in your questions before the conference, to post questions & comments during the Conference, and to stay connected with fellow math & science teachers well after the Conference!

See you in Ames on October 22nd & 23rd!
Visit our website for updates *http://www.iacad.org/ists/index.html*

From your Fall Conference Chair, DeAnna Tibben

From Our Vice Chair...

"Most formal definitions characterize critical thinking as the intentional application of rational, higher order thinking skills, such as analysis, synthesis, problem recognition and problem solving, inference, and evaluation" (Angelo, 1995).

A lot of the work I've done recently with other teachers has focused on critical thinking skills. Much of the literature I've read in preparing for these experiences is vague. It says critical thinking skills CAN be taught and SHOULD be taught...but lacks in a clear explanation of HOW we create critical thinkers in our classrooms.

I should be clear, there are some people who have attempted to define what thinking critically looks like in a science classroom. But, few have articulated clearly what a teacher's role is in the fostering of these 'critical thinking experiences'. So, how can we teach our students to think critically?

I offer the following points about teaching critical thinking skills to students…

• We must have a clear understanding about what critical thinking skills are, and what it looks like when students employ them in specific situations in their classrooms.
It goes without saying...if we don't know where the end is, how do we get there? If teachers don't know what critically thinking looks like during an activity or other classroom experience, how do we know if they're doing it? What's OUR understanding of critical thinking, and have we made it known to students?

• We must provide experiences that allow students to think critically, and make their thinking visible to others.
Once identified, teachers need to design classroom experiences that will allow students to think critically about...stuff. Whether it's the quantum mechanical model of the atom, or which antibacterial wipe to buy at Walgreen's, we have to give kids a chance to think. After they think, we need to provide opportunities for sharing their thoughts. Sharing creates an awareness of how students think and provides other students the chance to "see inside the minds" of others.

•Critical thinking must be practiced.
It's so easy for us to write in our plan books something like "critical thinking activity", then do the activity and move on. We have lots of reasons to worry about time being a factor in what we're able to teach, but let's face it...just like we won't get better at teaching critical thinking skills after one lesson, our students won't get better at thinking critically after one lesson.

Teaching critical thinking skills to our students must be a commitment on our part. Continued practice and reflection are key...both for us, and for students.

-- Eric Hall
ISTS Vice Chair

Iowa at the American Junior Academy of Science, Boston

Thank you to Lee A. Brogie, AJAS Executive Director, and Amy Strong, AJAS Assistant Director, for honoring the Iowa Junior Academy of Science representatives, Paolo Adajar and Madison McMinn at the 2013 AJAS/ NAAS Conference in Boston, MA.

I would also like to thank the Iowa Academy of Science leadership and membership for sponsoring the two student representatives and the adult chaperone. The experience was truly an "experience of a lifetime" for those involved! It was truly inspiring to see high school students communicating with scientists (including Nobel Laureates) about their own research projects. Witnessing these students become lifetime members of AJAS and to see their spark of science interest brought to "blazing flames" was truly a moment to be treasured!

Did you know that the American Junior Academy of Science (AJAS) is America's only honor research society for high school scientists? AJAS meets annually in conjunction with the American Association for the Advancement of Science (AAAS) annual meeting. AAAS is the largest scientific organization in the world and the publisher of 'Science'. AAAS serves as an authoritative source for information on the latest developments in science and bridges gaps among scientists, policy-makers and the public to advance science and science education.

Are you aware of the Iowa Junior Academy of Science? The Iowa Junior Academy of Science (IJAS) is supported by the Iowa Academy of Science. The Iowa Space Grant Consortium also supports the Junior Academy. The Iowa Space Grant Consortium provides an annual grant of $8000 toward the operating expenses of the Junior Academy. The $8000 is matched by the Iowa Academy of Science to create an endowment for the Junior Academy. IAS also relies on matching funds from outside donations.

You can also support IJAS and the future scientists of Iowa! If you have any business contacts who may be interested in contributing toward this match please contact Craig Johnson, IAS Executive Director. His email is craig.johnson@uni.edu and phone (319) 273-2021.

The objective of the Junior Academy is to promote the study of and participation in science by elementary and secondary students and teachers. IJAS Programs are developed to:

- promote an understanding of the importance of science and scientific research to meet many essential needs of society
- encourage students with interest and aptitude in science to participate in science research
- promote formal and informal discussions of science and scientific research by student groups, including teachers and members of the senior Academy, as appropriate
- help students explore career opportunities in science

These objectives put IJAS in the forefront as a resource for you to meet your District and State level Standards/ Benchmarks.

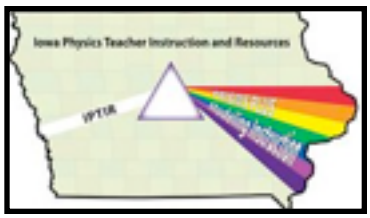
So how can you get involved? How can you get your students involved? Membership in the Iowa Junior Academy of Science is open to any Iowa student in grades K-12. Students may hold membership as an individual or participate in a school membership.

Membership will offer privileges of participation in many of the IJAS activities and resources and is required for students to participate in programs sponsored by the IJAS. Opportunities for input in the planning and implementation of activity programs are extended to members.

Please go to http://ijas.pbworks.com/w/page/13908525/Membership%20in%20IJAS for more information on joining IJAS today! You may also contact Marcy Seavey seavey@uni.edu.

I would also be happy to share with you my experiences with IJAS – it has truly opened doors of opportunities for my students!

-De Anna Tibben
deanna.tibben@ames.k12.ia.us



University of Northern Iowa
Department of Physics

Modeling & PRISMS Workshops

Physics Teachers:

Iowa Regents Modeling and PRISMS Workshop, Summer 2013 and Academic Year 2013-14

The Iowa Regents Modeling and PRISMS Workshop, with funding by the Roy J. Carver Charitable Trust, provides professional development for high school physics and physical science teachers. It is the third summer workshop in Modeling Instruction for high school physics and physical science teachers. The first two workshops were offered in 2011 at Iowa State University and in 2012 at the University of Iowa. For the third summer workshop, Modeling Instruction will be integrated with Physics Resources and Instructional Strategies for Motivating Students (PRISMS) PLUS. The goal of the workshop is to provide Iowa science teachers with local access to the exemplary professional development programs of Modeling and PRISMS and to support their implementation of the curricula in their classrooms to improve their instructional practices and increase teacher and student understanding of physics concepts. Both curricula are aligned with the Iowa Core and national science education initiatives. The workshop will be facilitated by master high school physics teachers (Shannon McLaughlin and Les Burns) in collaboration with university physics and science education faculty (Larry Escalada and Jeff Morgan).

The workshop is a one-year professional development program that will include an intense three-week summer institute on the UNI campus from June 10 – 28, 2013 followed with 2013-14 academic year professional development and support.

Participants will receive a stipend, 5 semester credit hours of UNI physics graduate credit at a considerable discount to be paid by the participant, instructional resources and support, summer housing and meals, possible access to classroom physics resources available on loan, etc. See the brochure and application for details. **Application deadline: March 29, 2013**. For more information, contact Shannon McLaughlin (SMcLaughlin@norwalk.k12.ia.us) or Dr. Larry Escalada (Lawrence.Escalada@uni.edu) for details.

State Physics Competition

Iowa Physics Opportunity:

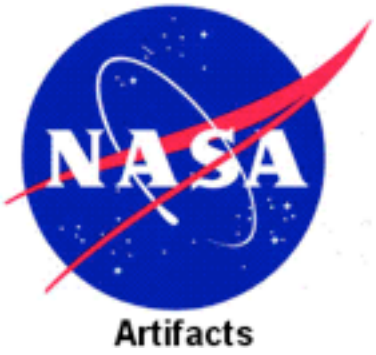
The 2013 State Physics Competition will be held on **April 17th (Wednesday) 2013** at the University of Northern Iowa (UNI) McLeod Center in Cedar Falls.

- 2013 Physics Competition Rules (2_12_13 Version now includes Material Recovery Facility Event)
- Registration Form
- Certification of Compliance Form
- Schedule
- Information
- April 2012 Results

Students will use a variety of everyday, inexpensive materials including mousetraps, compact discs, rubber bands, toothpicks, soda straws, etc. to build their devices such as catapult, mousetrap car, bridge building, soda straw arm to accomplish specific tasks.

Schools must qualify in their AEA regional competition in order to compete in the State Physics Competition. See State Competitions section of the Rules for details on the school team and event team regional winners who are eligible to compete in the State Competition. If there is no regional competition in an AEA region, two schools per AEA region may compete at the State Competition with a maximum of 5 event teams for each school. If there is no regional competition in your AEA, contact your AEA science consultant to let him/her know that you are interested in participating in the State Competition. You may also want to contact a neighboring AEA to determine if it is possible to compete in their regional competition.

Coordinators for regional competitions must provide a list of their teams that qualify for the State Competition no later than April 12, 2013 to Lawrence.Escalada@uni.edu. AEA science consultants who do not have regional competitions in their AEA should also provide a list of teams who may participate in the State Competition. All teams that compete in the State Competition must complete and submit a registration form with payment.



NASA Artifacts

NASA is inviting eligible educational institutions, museums, and other organizations to screen and request historical space artifacts. The artifacts represent significant human spaceflight technologies and processes and the accomplishments of NASA's many programs. NASA and the General Services Administration worked together to ensure broad access to space artifacts and to provide a Web-based electronic artifacts viewing capability. The Web-based artifacts module is located at http://gsaxcess.gov/NASAWel.htm.

Eligible participants may view the artifacts and request specific items at the website through **March 4, 2013**. Only schools and museums are eligible to receive artifacts. They must register online using an assigned Department of Education number, or through the state agency for surplus property in their state. The artifacts are free of charge. Eligible organizations must cover shipping costs and any special handling fees. Special items, such as space shuttle thermal protective tiles and packages of three packets of astronaut food, also are offered on a first-come, first-served basis.

Questions about this opportunity should be directed to GSAXcessHelp@gsa.gov.

Summer Teacher Research Experience

In their eleventh year, these ISU educational programs have helped to support hundreds of middle and high school teachers incorporate real-world research into their teaching. These research experiences are designed and facilitated by both university faculty and K-12 teachers, which makes for a wonderful learning experience. High school teachers who participate in this seven-week program are paired up with a researcher on the ISU campus. Programs also provide teachers with opportunities to network and create experiences for their students which incorporate their summer experience.

There is also a Summer Academy for middle school teachers. It runs for 3 weeks and focuses on helping teachers learn about and incorporate biorenewables into their curriculum. The Summer Academy takes place on the ISU campus in state-of-the-art labs and research facilities.

Both programs provide a generous stipend and living accommodations for teachers who live outside the Ames area.

If you're interested in applying, here's the link: http://www.cbirc.iastate.edu/education/

Don't hesitate to contact me if you have additional questions!
eric.hall@dmschools.org

States Soon to Weigh Science Standards Adoption

In the January 30 edition of *Education Week*, Erik Robelen explores the decisions that will be made by states regarding adoption of the Next Generation Science Standards (NGSS), set for release this spring. According to the article, "the 26 'lead state partners' helping to develop the K–12 standards have agreed to 'give serious consideration' to adopting them. Recent interviews with officials in a number of those states, such as California, Delaware, Kansas, and Maryland, reveal a generally positive reaction to the second and final public draft, issued this month for comment." Read the full article here.

from February 4, 2013 *NSTA Express*

Announcement:

2013 ISTS Fall Conference

Date Change

Please spread the word!

Tuesday & Wednesday

October 22 & 23, 2013

Mark Your Calendar

Plants In Society - Beyond the Basics In Your Classroom

SUMMER WORKSHOP FOR ELEMENTARY K - 5th GRADE TEACHERS

STIPENDS ($700) and TRAVEL ALLOWANCE FOR ALL ATTENDEES.

When: July 8-12, 8:30 AM - 4 PM
Where: Parkview Middle School, Des Moines.

The National Science Foundation (NSF) is sponsoring a workshop for elementary school teachers to become more acquainted with plant anatomy, physiology, ecology as well as the diversity of uses plants have in society.

Iowa State University is hosting the workshop, which will be presented by leading faculty, graduate students and FOSS Science Consultant Lynne Bleeker. The FOSS modules "New Plants" and " Structures of Life" will be used extensively to demonstrate pedagogy and content relating to teaching about plants in the elementary setting. The workshop will include a field trip to Reiman Gardens in Ames, Iowa State University green houses and the Bio-century Farm. Transportation for the field trip will be provided.

Please complete the following application form by March 1, 2013. http://www-archive.cbirc.iastate.edu/elem_summer_plant.asp

For more information please contact:
Dr. Adah Leshem
<adah@iastate.edu>

NASA's Digital Learning Network

Would you like your students to discuss ideas with real scientists?

NASA's Digital Learning Network (DLN) offers videoconferences (with NASA specialists and engineers), webcasts, interactive lessons and PD events that feature NASA-related science, technology, engineering and mathematics instruction for grades K-12. Resources available as well as a short video that explains all the site can offer educators and students is available at their website: http://www.nasa.gov/offices/education/programs/national/dln/index.html

Science, Naturally App

Science, Naturally! has two new applications for the iPad, iPhone, and iTouch! Our new Apps, ***101 Science*** and ***101 Math***, are engaging quizzes that fit right in the palm of your hand. Based off of the popular award-winning books, *101 Things Everyone Should Know About Science*, and *101 Things Everyone Should Know About Math*, these apps are not only fun and educational…they are also **FREE!**

Iowa Water Conference

H20: Humans, science and oversight

March 4-5, 2013 | Scheman Continuing Education Building | Ames, Iowa

The Iowa Water Conference is a collaborative effort featuring participating conferences of Ag and the Environment, Floodplain Management, Stormwater and Water Monitoring. The goal of this partnership is to create greater awareness of Iowa urban and agricultural water issues through sustainable watershed management.

Plenaries sessions include:

- Jerry Hatfield, USDA-ARS
- Bill Stowe, Des Moines Water Works
- Eric Eckl, Water Words that Work
- Kamyar Enshayan, University of Northern Iowa

And a panel discussion on the Intended and Unintended Consequences of Regulation, with a presentation by Cathy Kling, ISU Center for Rural and Economic Development.

For additional details and to register:

http://www.aep.iastate.edu/iwc/

University of Washington Summer Institute in Physics and Physical Science

June 24-July 26, 2013 (tentative)
Department of Physics, University of Washington, Seattle

The Center for Physics Education in the University of Washington Physics Department offers a five-week, 10-credit summer institute in physics and physical science for full-time inservice teachers. The 2013 institute is tentatively scheduled for June 24-July 26 at the UW in Seattle. Classes meet from 9 a.m. to 3:45 p.m. Monday-Thursday, except for occasional Fridays. Directed by Professor Lillian C. McDermott and supported by the National Science Foundation, the institute is tuition-free and a $1500 stipend is offered upon successful completion of the course work. Additional money may be available if needed to help defray the cost of lodging for persons from outside the Seattle area.

The *Physics by Inquiry* curriculum used has been especially designed to strengthen the background knowledge of teachers in topics typically covered in precollege physics and physical science using inquiry-oriented instruction. The materials emphasize the development of fundamental concepts and reasoning skills through laboratory experience. The class is divided into two sections: one for elementary-middle school teachers who may have little or no background in physics; the other for high school teachers of physics, physical science, and mathematics.

The application deadline is March 1, 2013.

Additional information is available on our website <https://courses.washington.edu/uwpeg/2013-summer>.

Kids To Parks Contest May 18, 2013

NATIONAL Park Trust

This year NPT is once again hosting the Kids to Parks Day School Contest!

The purpose of the contest is to help teachers engage their students with their local parks. This national contest is open to all schools across the country and in the U.S. territories. Students can submit proposals for a KTP event at a park in their community. NPT will award scholarships up to the amount of $1,000 to winning entries for each class. Scholarships will be used by the winners to implement their KTP event during the week leading up to May 18th. Go to http://kidstoparks.org/school-contest for more information.

Deadline for entries is Friday, March 1. Winners will be announced Monday, March 18, 2013.

Sunwise Poster Contest

Enter the 11th annual SunWise with SHADE Poster Contest!

Students in grades K-8 are invited to help raise awareness about sun safety and win great prizes by submitting original, hand-drawn posters showing sun safety action steps.

Prizes* include a SHADE 'N Net shade cover, a family trip to Disney World, digital cameras, and UV-sensitive beads!

Deadline os April 1, 2013. No fooling!

For more information see http://www.shadefoundation.org/poster-contest.php

Ag Energy Webinars

Eastern Iowa Community Colleges and Iowa State University are hosting a series of **FREE** webinars on integrating the latest research on energy into the classroom. The 60-minute webinars for high school and community college faculty will present the research, free curriculum, and a hands-on activity. The spring webinars will be held from 4:30 to 5:30 pm EDT on February 20, March 28, and April 23, 2013.
This project is funded by the United States Department of Agriculture. Award No. 2012-38414-19559

Webinars
February 20, 2013: Wind Power: An Attractive Source of Energy for Iowa and the U.S.

March 28, 2013: Metabolic Engineering of Microbes for the Production of Biorenewable Fuels and Chemicals

April 23, 2013: Building Science

Click to Register: http://agenergyia.org/webinars/

ag ENERGY
AGRICULTURAL ENERGY CURRICULUM

'Bugscope' lets kids explore insects through an electron microscope

The Bugscope project provides free, interactive access to a scanning electron microscope over the internet, so that students anywhere in the world can explore the microscopic world of insects.

Run by the Beckman Institute's Imaging Technology Group (ITG) at the University of Illinois at Urbana-Champaign, Bugscope helps teachers give their students the chance to become scientists: The kids propose experiments, explore insect specimens at high magnification, and discuss what they see with university scientists—all from a regular web browser over a standard broadband internet connection.

Teachers sign up, ask their students to find some bugs, and mail them to ITG, which then schedules a session and prepares the bugs for insertion into the electron microscope. When your session time arrives, ITG puts the bugs into the microscope and sets it up for your classroom. Then, you and your students log in over the web and control the microscope. ITG scientists are available via chat to guide you and answer students' questions. After your session, you can return to the website to view every chat line, image, and sample you—and every other classroom—has collected.

http://bugscope.beckman.uiuc.edu/

Water Rocks!

We are pleased to let you know that the Water Rocks! website (www.waterrocks.org) is live, including a number of exciting features that have launched since the ISTS conference in October. There are two features in particular that we'd like to showcase for you and your students:

Rock Your Watershed! Game

Rock Your Watershed! is an interactive game that challenges students to select land management practices for ten parcels of land in a shared watershed, while balancing profit (from agricultural crop production) and water quality parameters (sediment, nitrogen, and phosphorus). Profit and water quality parameters come together to yield an overall score, but precipitation each year is an unknown variable that can make a big difference!

The game's algorithms are grounded in scientific studies correlating land management choices, sediment and nutrient transport, economics and precipitation in the state of Iowa. It's a fun way to get upper elementary, middle school, and high school students thinking about the connections between land management choices and the health of our natural resources – also a fun (and competitive) way to review concepts at the end of the semester!

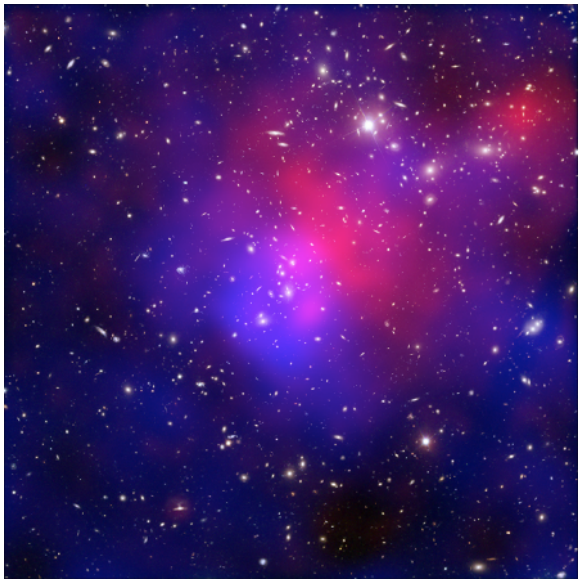
The first level of the Rock Your Watershed! game was debuted in November and was played 450 times in its first two weeks. One 7th grader told us that he had to play the game 17 times before he figured out where it made sense to place different practices for a good score. How's that for engagement — how many 7th graders do you know that will sit through a textbook-based lesson 17 times?

You can find ROCK YOUR WATERSHED! in the left hand menu of the website. The game is computer, ipad- and tablet-friendly, requiring internet access. Try it with your students today!

Free School Visits from the Water Rocks! Team

Interested in requesting a FREE school visit from the Water Rocks! team and/or Conservation Station trailer?

At the bottom of the Water Rocks! homepage, you'll see CATCH THE WAVE and submenus that provide additional information about our outreach efforts. The "Water Rocks! Outreach and Conservation Station" page is where you can submit requests to have the team visit your school. Click on the "Learning Modules" page to see the variety of interactive, hands-on teaching modules that we have available for school visits. We're currently accepting requests for spring and fall 2013 events, so get those requests in now!



Clusters of galaxies collide in this composite image of "Pandora's Cluster." Data (in red) from NASA's Chandra X-ray Observatory show gas with temperatures of millions of degrees. Blue maps the total mass concentration (mostly dark matter) based on data from the Hubble Space Telescope (HST), the European Southern Observatory's Very Large Telescope (VLT), and the Japanese Subaru telescope. Optical data from HST and VLT also show the constituent galaxies of the clusters. Such images begin to reveal the relationship between concentration of dark matter and the overall structure of the universe.

Tackling the Really BIG Questions

by Diane K. Fisher

How does NASA get its ideas for new astronomy and astrophysics missions? It starts with a Decadal Survey by the National Research Council, sponsored by NASA, the National Science Foundation, and the Department of Energy. The last one, *New Worlds, New Horizons in Astronomy and Astrophysics* was completed in 2010. It defines the highest-priority research activities in the next decade for astronomy and astrophysics that will "set the nation firmly on the path to answering profound questions about the cosmos." It defines space- and ground-based research activities in the large, midsize, and small budget categories.

The recommended activities are meant to advance three science objectives:

1. Deepening understanding of how the first stars, galaxies, and black holes formed,
2. Locating the closest habitable Earth-like planets beyond the solar system for detailed study, and
3. Using astronomical measurements to unravel the mysteries of gravity and probe fundamental physics.

For the 2012-2021 period, the highest-priority large mission recommended is the Wide-field Infrared Survey Telescope (WFIRST). It would orbit the second Lagrange point and perform wide-field imaging and slitless spectroscopic surveys of the near-infrared sky for the community. It would settle essential questions in both exoplanet and dark energy research and would advance topics ranging from galaxy evolution to the study of objects within the galaxy and within the solar system.

Naturally, NASA's strategic response to the recommendations in the decadal survey must take budget constraints and uncertainties into account.

The goal is to begin building this mission in 2017, after the launch of the James Webb Space Telescope. But this timeframe is not assured. Alternatively, a different, less ambitious mission that also address the Decadal Survey science objectives for WFIRST would remain a high priority.

The Astrophysics Division is also doing studies of moderate-sized missions, including: gravitational wave mission concepts that would advance some or all of the science objectives of the Laser Interferometer Space Antenna (LISA), but at lower cost; X-ray mission concepts to advance the science objectives of the International X-ray Observatory (IXO), but at lower cost; and mission concept studies of probe-class missions to advance the science of a planet characterization and imaging mission.

For a summary of NASA's plans for seeking answers to the big astrophysics questions and to read the complete Astrophysics Implementation Plan (dated December 2012), see http://science.nasa.gov/astrophysics/. For kids, find lots of astrophysics fun facts and games on The Space Place, http://spaceplace.nasa.gov/menu/space/.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.